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PROPOSAL FOR THE CREATION OF MSMES PRODUCING PIGLET SEMEN IN MARGINALIZED COMMUNITIES OF THE STATE OF OAXACA

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ABSTRACT

The objective of this work is to propose the creation of Micro, Small and Medium Enterprises (MSMEs) dedicated to piglet semen production in marginalized communities of the State of Oaxaca. This geographic region, located in the South-Southeast of Mexico, is characterized by high levels of informal economic activity, which reflects the inability of the productive apparatus to generate sufficient employment. As a result, the population relies on survival strategies linked to low-profit informal activities, particularly in the tertiary sector. The guiding hypothesis of this proposal is that establishing MSMEs specialized in piglet semen production within marginalized communities of Oaxaca will help reduce unemployment, stimulate the primary sector, and combat poverty in these areas. The methodology applied consists of using financial indicators to measure the profitability, as well as the economic and social viability of the project, and its contribution to regional development in the study area. Since the project is already being implemented by a graduate student of the professional master's program in Animal Production at UABJO, the research could be carried out, and the results support acceptance of the hypothesis, making this a viable proposal for marginalized communities.

KEYWORDS: Production, Marginalization, Micro, Small and Medium Enterprises, Informality.

1. INTRODUCTION

MSMEs in the Mexican economy have played an important role as generators of employment, given that in the latest INEGI report it mentions that 99.8% of the establishments that exist are MSMEs, and in the period of 2019-2023 1.7 million microenterprises were opened, in the same way 1.4 million closed, arguing that as an effect of the COVID 19 pandemic there was this behavior, but presenting greater mobility in the tertiary sector (INEGI, 2024).(2024)

The State of Oaxaca reports 81% informality; the Ministry of Labor and Social Prevention reports that the Oaxacan entity, of the 1.8 million employed people, 1.4 million work in the informal sector, 76.3%; within the formality 33.8% work; so it can be seen that it is the informal sector that generates the largest number of jobs; so the International Labor Organization argues that this sector is not only formed by unemployment, but also by the population that receives insufficient monetary income received by the employed population; the population that does not have any monetary income as a result of their economic activities; those economic activities that are not registered or articulated with the State.(México, 2025)(OIT, 2019)

Marginalization is a social phenomenon that excludes the population from the benefits of development, the National Population Council where indicators of education, housing, monetary income and population distribution are taken into account; therefore, this work has the general objective of making a proposal for the creation of Micro, Small and Medium Enterprises (MSMEs) producing piglet semen in marginalized communities of the State of Oaxaca.(CONAPO, 2019)

Given that the State of Oaxaca has been characterized by its levels of poverty and marginalization, this proposal is made that will allow the population to have a way to produce and obtain a monetary income; so the work is divided into three sections, the first the frame of reference where it is included in the state of the art; in the second a description of the results of the levels of poverty, informality and marginalization in the State of Oaxaca, finally with an analysis of the proposal.

The third section is the study of the viability of the MSMEs producing piglet semen, this being a small pig, so apart from obtaining an immediate economic income they will also have food in kind which can be consumed immediately, the methodology is cabinet and field, through recent research work of peer-reviewed journals information was obtained to carry out the state of the art.

The field part was carried out by the students Alonso Efraín López Hernández, from the professionalizing master's degree in Animal Production, from the veterinary and zootechnical school of the Autonomous University "Benito Juárez" of Oaxaca (UABJO); which serves as an example to carry out this proposal as a survival strategy, for those municipalities with characteristics of high rates of marginalization in the State of Oaxaca.

2. FRAME OF REFERENCE

Animal production can be carried out in small areas of land, which contribute to the rural development of communities, as a source of savings and monetary income, providing economic and food security to the population, and contributing to the benefit of the vulnerable population. So this activity is viable in municipalities where the population has land spaces; so sometimes they are idle. (Jordán & Ortega, 2014)

Among the challenges we face as a population: climate change, poverty levels, population increase, scarcity of resources due to soil degradation, change of land use from rural to urban due to the disorderly growth of municipalities, which is why Milera and Santana mention that pork production does not require expensive spaces and facilities, and that it has nutritional characteristics in minerals, vitamins for human beings. (2022)

In La Gomera, a Canary Island in Spain, it was the place where pigs were raised for the first time (1493) it was on the second voyage of Christopher Columbus, in that period poverty was not a problem since it was a natural condition that existed; and that the pig's feed was so that this population could survive, in the research: *Pigs and Social Control of the Poor in the Province of Antioquia, Seventeenth Century* (Gómez, 2016) He mentions that pig farming was relegated as a marginal activity of the population in poverty, serving as a sustenance to cover their basic needs.

So it can be observed that for centuries this production has been done as a survival strategy, so the small-scale production systems in the Mexican economy have been invested in the different types of government to reduce the high rates of marginalization in order to exercise public resources.(Hernández, Torres, & Hernández, 2023)

Pig farming is a branch of zootechnics, where the production of pork is an important source of protein, therefore, 30% of the population consumes this meat worldwide, since it provides minerals such as selenium, iron, zinc, phosphorus, potassium, magnesium and vitamin B1 which have an important function in the human body.(SCHTI, 2024)

2.1. Marginalization

Commonly to conceptualize the term marginalization in research works it is analyzed from different spheres, commonly the marginalization index of the National Population Council is taken, in which it includes the population excluded from certain services such as education, health, housing conditions, number of inhabitants of the place where they live, language, as well as the monetary income they receive below the poverty line.(Sotelo-Forero, Ayala-Suárez, & Vallejo-Zamudio, 2025). This indicator of marginalization is measured at the national, state, municipal and locality levels, so it encompasses the aforementioned variables, which evidences the lack of public policies or that economic development did not reach certain areas of a geographical space, in this case this indicator will be analyzed in the State of Oaxaca. to make the proposal.

2.2. Msmes

Micro, Small and Medium Enterprises are classified according to the number of workers they have and the economic sector to which they are assigned; according to INEGI's (2018) classification of MSMEs in the service sector, micro MSMEs have 0 to 10 employed people; Small companies have 11 to 30 employees and medium-sized enterprises with 31 to 100 workers (Antonio Máximino Carmona López & Ramos-Soto, 2020)

2.3. Study Area Results

The State of Oaxaca covers eight geographical regions and 570 municipalities divided within each of the regions; each of them is heterogeneous, as well as cultural and economic differences. The state has 4,132,148 inhabitants, the average education is 8.1, so the average of the population has completed up to the second year of secondary school according to the average indicator that is reported.(INEGI, 2020). According to informality data in the Oaxacan entity, it is reported that in 2025 the total population working in labor informality is 1,372,617 of which 701,489 work in the informal sector; 169,832 companies in the formal sector with informal employment; 58,268 informal domestic workers; 443,028 informal workers in the agricultural sector.(STPS, 2025)

Table 1: Minimum Wages.

Period	Receives no income	Less than a S.M	From one to two S.M.	More than two to five S.M.	More than five to ten S.M.	More than ten S.M.	No specific
2024	325596	816188	396417	76457	5468	374	223147
2025	283655	834295	414636	58521	6450	660	201397

Data Obtained From The Ministry Of Labor And Social Protection (STPS, 2025)

Table one shows that, of the 1,823,647 of the employed population that reports receiving monetary income, 17.85% of the population is in the absolute poverty group since they report not receiving income; 66.49% are below the poverty line, since it is the total population that reports receiving less than one minimum wage and those who report one to two salaries, since an indicator of marginalization is the population that reports receiving less than two minimum wages.

So it can be deduced that in the year 2025 the employed population in the State of Oaxaca approximately 18% is absolute poor and 66.49% is poor, therefore, 84.34% of the employed population is in the poverty group; and 17.85 extreme poverty.

Table 2: Salary Increase 2010-2025.

Period	*Nominal*	*Real*
2010	4.8	1.06
2011	4.7	0.49
2012	4.5	0.36
2013	6.3	2.29
2014	3.8	0.73
2015	5.3	2.3
2016	4.8	1.68
2017	3.8	-1.1
2018	4.4	0.22
2019	4.9	-0.14
2020	5.1	0.79
2021	5	0.27
2022	4.8	-3.91
2023	7.9	2.72
2024	5.6	0.28
2025	6.7	2.53

Source: Data Obtained From The Ministry Of Labor And Social Protection (STPS, 2025)

In table two it can be seen that, if there has been a salary increase in the State of Oaxaca from 2010 to 2025; but that according to the behavior of the economy has had a loss of purchasing power; because in the nominal increase column without taking inflation into account, it is observed that in all years there was an increase; In the real wage increase column, when inflation is taken into account, there was a notable decrease.

In the years 2017, 2019 and 2022 there was a real decrease in the monetary income received by the employed population in the State of Oaxaca, and in 2023 and 2025 the percentage of the nominal wage increase was notable, but when analyzed with the real salary it had a loss of more than 50% of wages (see graph 1).

With these data that were analyzed of the population employed in the informal sector, it is proven what the International Labor Organization mentions that the population that makes up the informal sector group is a group of the employed population that receives monetary income, but does not cover their basic needs and is going to be part of this sector; as well as those who have no monetary income or who are immersed in poverty.

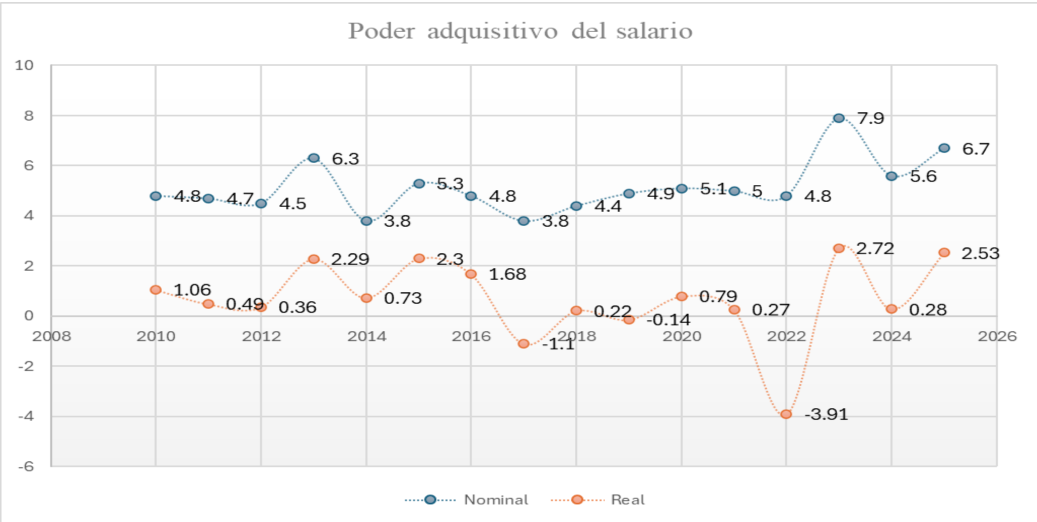


Figure 1: Salary Increase In The State Of Oaxaca 2008-2025.
In Original Language Spanish.

2.4. The Proposal

The project is currently being carried out in the municipality of Rojas de Cuauhtémoc, belonging to the district of Tlacolula, located in the region of the Central Valleys of the State of Oaxaca.

Type of product: Porcine semen is a biological and perishable product, used as a zootechnical input for artificial reproduction. It is highly effective when applied correctly, and allows for progressive genetic improvement of the breeding herd.

Each stallion is healthily evaluated and has a zootechnical registration, which guarantees its genetic quality and reproductive performance. The doses will be identified by breed and stallion, to offer the producer complete information that allows him to better plan his breeding scheme.

2.5. Product Presentation

- Format: 100 ml bottles per dose.
- Storage: Refrigerated between 15–18 °C, with a shelf life of 2 to 4 days.
- Labeling: Each dose contains the stallion information, date of collection and batch number.

2.6. Product Contributions

The pig semen produced in this project not only represents a biotechnological input, but also a tool for economic and social development for small producers, thanks to the use of semen from improved breeds, producers will be able to:

- Increase the number of piglets per farrowing, with more uniform litters and higher commercial value.
- Avoid the cost and health risk of keeping a stallion.
- Reduce perinatal mortality, by using health-evaluated males.
- Access reproductive technology without the need for complex infrastructure, which makes it viable even in backyard units.

2.7. Market Segmentation:

- End users: Small and medium-sized pig farmers (current and potential).
- Geographical area: Rojas de Cuauhtémoc and

neighboring municipalities (Santa María Guelacé, Tlacolula, San Sebastián Abasolo).

- Demographics: Male producers, young adults (25–55 years), with basic experience in pig production predominate.
- Income: Low to medium. They are looking for inexpensive and effective reproductive solutions.

2.8. Demand

In municipalities such as Rojas de Cuauhtémoc, pig production is mainly carried out on a small scale, in backyard or family units. According to data from INEGI (2020), there are more than 333,000 pigs in the State of Oaxaca, of which 27.4% are breeding wombs. However, artificial insemination is not yet widely implemented due to lack of access to pig semen, technical training and logistical costs.

Currently, most producers use their own or borrowed stallions, which implies health risks, low genetic efficiency and high maintenance costs. Although the demand for pig semen is not visible in commercial figures, there is an unsatisfied demand detected in the field, and that can be activated if the product is offered with accessibility and technical support.

Currently, only a minority of producers use artificial insemination, and they do so with inputs acquired outside the State, which raises production costs and decreases the economic viability of their systems. It is estimated that at least 30 producers are interested, with the possibility of growth if the results are visible. Based on direct surveys with local pig farmers, an initial potential demand of at least 30 to 50 doses per month is estimated, concentrated in small and medium-sized producers who already have breeding sows and need to improve their efficiency without large investments. This number can double within the first year as positive results and word-of-mouth recommendations are generated.

To estimate the potential demand, the following assumptions are considered:

- Approximately 35 active pig producers in the immediate coverage area.
- Each producer has an average of 5 breeding sows.
- Each sow can be inseminated twice a year.

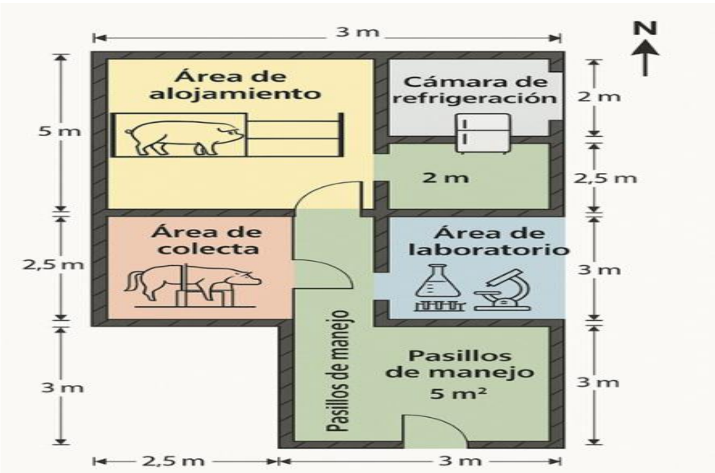
2.9. Conclusions Of The Application

The analysis shows that the project can start with an estimated demand of 350 doses per year in its first stage, concentrated in producers in Rojas and neighboring municipalities. This figure may increase progressively to more than 700 doses per year as confidence in the product is consolidated and coverage is expanded. The economic context, the lack of local suppliers and the high need to improve pig genetics in the region support the commercial viability of the project.

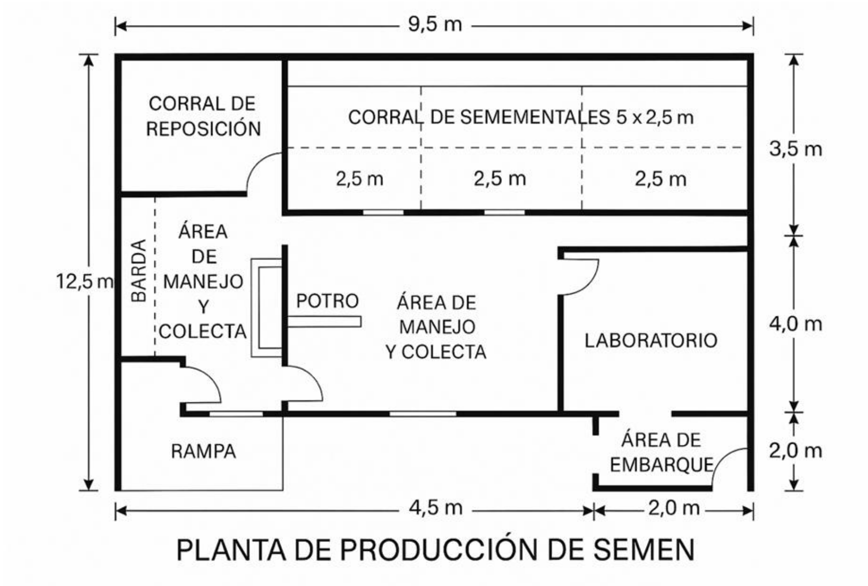
2.10. Project Space Distribution

AREA	MAIN FUNCTION	ESTIMATED DIMENSIONS
Corral de Sementales	Individual accommodation to avoid fights and facilitate handling	2 corrals of 2.5 x 3 m
Collection Area	Area with extraction foal	3 x 3 m
Laboratory	Semen evaluation, dilution, packaging and labeling	3 x 3 m
Refrigeration/Storage	Semen storage at 17 °C	2 x 2 m (refrigerator)
Boarding Area	Delivery of the product to the customer or its shipment	2 x 2 m
Replacement Corral	For stallions in rest or rotation	3 x 3 m
Circulation Corridors	Separation of clean/dirty areas, safe handling	5 m² approx.

Source: Prepared By The Master's Thesis Student In Veterinary Medicine And Zootechnics



Source: Prepared By The Master's Thesis Student In Veterinary Medicine And Zootechnics. In Original Language Spanish



In Original Language Spanish

2.11. Labor

The efficient operation of the pig semen production center requires trained personnel in the different stages of the process, from the handling of stallions to the evaluation and conservation of genetic material.

Stand	QUANTITY	MAIN FUNCTIONS	TYPE OF CONTRACTING
Animal Reproduction Technician	1	Semen extraction, evaluation, dilution and packaging.	Full-time
Animal Handling Assistant	1	Stallion management, corral cleaning, collection support.	Part-time (flexible)
Administrative Staff / Sales	1 (optional)	Order scheduling, customer service, inventory control.	Part-time/ multitasking

Source: Prepared By The Master's Thesis Student In Veterinary Medicine And Zootechnics

Their contribution to Regional Development must be analyzed, so the social evaluation of the elaboration and evaluation of Community Projects is important, therefore their contribution to Economic Growth must be taken into account; to Employment; to the white of payments, to investment, to value added per person and to Consumption, therefore, the methodology that allows analyzing this contribution is described below.

2.12. Type Of Organization

The Oaxaca Swine Gene Transfer Center (CTG) will be established as a natural person with business activity, allowing it to operate legally under a simple and functional scheme. This figure facilitates fiscal management, the issuance of invoices and access to productive support programs. In the medium term, the business will be able to evolve into a Rural Production Society (SPR) to integrate other producers, improve access to financing and strengthen its commercial position in the region.

2.13. Waste Management

The Oaxaca Swine Gene Transfer Center will generate a minimum amount of waste, because its main activity is the extraction and conservation of pig semen, without handling large volumes of animals or contaminating processes. Since empty containers, latex gloves, paper, sanitary napkins, cardboard boxes will be used, which will be handled in differentiated containers, separated into recyclable and non-recyclable, and their final destination will be delivered to the municipal collection system in appropriate bags.

2.14. Finance

According to the information provided, the project that is in operation reports that annually there are revenues of $655,270.18 and costs of $432,800.00, having a profit of 222,470.18, so an analysis of the contribution that the project will have in the regional development of the State of Oaxaca was made, following the following reasons.

2.15. Contribution To Economic Growth

The indicators of the Gross Domestic Product

(GDP) of a geographical space are needed, whether it is called an entity or a country. VA and the Value added to the project being the sum of wages, salaries, profits and indirect taxes minus the subsidies of the project.

$$CCE = \frac{VA}{PIB} * 100)$$

By substituting the values and including the GDP of the State of Oaxaca for the year 2023 we obtained the following: 825,000.00 /447, 312,000 * 100 = 0.18 so the Rojas de Cuauhtémoc project contributes to the economic growth of the State of Oaxaca with 0.18%.

The contribution to economic growth (CEE), as a percentage, will be equal to the formula proposed above, so the higher the value will indicate that the project contributes more to the region.

2.16. Contribution To Employment

$$CE = \frac{E}{PEA} * 100$$

By substituting the values 15/640 * 100 = 2.34%, the PEA is from the municipality of Rojas de Cuauhtémoc of the same year 2023, so the project contributes with 2.34% of the jobs in the municipality where the project is operating.

The contribution to employment (EC) can be measured by comparing the employment of project E with the Economically Active Population (EAP) of the municipality or area where the project will be launched.

2.17. Contribution To Investment

With data from the technical study and the financial study, the amount of resources required by the project is computed, that is, the investment generated by the project.

$$CI = \left(\frac{I}{IR}\right) * 100$$

The investment of the project according to the supporter mentioned that he invested $ 80,000.00 / 805,161,600 * 100 = 0.009%.

Through the (IR) of the respective sectors of the region where it is intended to invest in the project, be it the primary, secondary, tertiary sector. (I) it will be the investment that is economically intended to be invested in the project; in this case, the project contributes 0.009% to the investment of the primary sector.

2.18. Contribution To Regional Development

In this case, the project expenses or purchases in the region are used as indicators, including the payment of labor (G) and the total value of the project's expenditures (GP).

$$CDR = \frac{G}{GP} * 100$$

3. DISCUSSION

The data from the study indicate a high level of labor informality in Oaxaca, with approximately 76% of the population employed in informal conditions (STPS, 2025). This is in line with recent figures from INEGI (2025), which report that in the first quarter of 2025, 76.3% of employment in the state corresponds to the informal sector, significantly exceeding the national average.

A broader investigation also indicates that in certain southern states, such as Oaxaca, informality exceeds 75%, consolidating the seriousness of the phenomenon in the region.

This high informality has direct repercussions on real labor income and living conditions. In fact, according to BBVA Research, in the first quarter of 2024, those in working poverty cover only 42.3% of the food basket with their income (BBVA Research, 2023).

In Oaxaca, this situation is more acute: in 2023, 58.7% of the employed population lived in working poverty (BBVA Research, 2022), a figure in line with the 84.3% of the employed population who, according to your 2025 data, are in a situation of general poverty (extreme or moderate).

On the other hand, despite nominal increases in minimum wages (such as the 20% increase) (Mexperience, 2024), evidence suggests that the recovery in purchasing power has been uneven. At the national level, real wages have increased significantly (86.6% between 2019 and 2024) (OECD, 2024), but given the productive structure and high informality, this positive impact could be concentrated in formal sectors, while conditions in Oaxaca remain precarious.

The situation is complicated by the marked deterioration in real wages during certain years, such as 2017, 2019 and 2022, with only a slight recovery in 2023 and 2025, suggesting a sustained erosion of real income. This contributes to the fact that only a small proportion (less than 20%) of the employed population in Oaxaca has enough income to meet their basic needs.

In addition, there are significant regional and gender gaps. The informal sector in Oaxaca is highly feminized and marked by inequities: only about 33% of women participate in the labor market and a large proportion do so in informal unpaid conditions (BBVA Research, 2023). This dynamic limits both women's economic empowerment and their resilience to shocks.

This socio-economic context highlights the urgency of projects such as the pig transfer centre. Providing access to quality genetic inputs could improve productivity and yields in backyard systems, reducing stallion maintenance costs and perinatal mortality. However, the purchasing power of producers remains severely limited. Therefore, the success of the project will depend not only on technology, but also on technical support, accessible financing (possibly subsidies or payment facilities) and cooperative marketing strategies.

Implementing a social economy model (such as a Rural Production Society) could be key to cohesive resources, distribute risks and strengthen economic sustainability in an environment of high informality and poverty.

4. CONCLUSIONS

The research achieves the general objective of making a proposal for the creation of Micro Small and Medium Enterprises (MSMEs) producing piglet semen in marginalized communities of the State of Oaxaca, since it is evident that the region that is being proposed has marginalized municipalities and localities with poverty percentages, and also that the productive apparatus does not generate enough jobs giving a growth of informal jobs.

The hypothesis is accepted since through MSMEs producing piglet semen in marginalized communities of the State of Oaxaca, it will reduce unemployment levels, boost the primary sector and combat poverty in marginalized communities of the State of Oaxaca, given that through a financial study their participation in the gross domestic product is evidenced. in investment, and in the contribution of jobs in the region; which makes it possible to conclude that the proposed project is viable.

In the study of the context of the geographical area, it can be observed that the population, since they do not have a monetary income that allows them to satisfy their basic needs, nor a job, since they have it in agricultural activities but do not obtain a monetary income, they become a list in the informal sector, so this proposal will allow them to be productive and generate monetary income. their own employment, and direct and indirect jobs.

REFERENCES

Antonio Máximino Carmona López, A. R., & Ramos-Soto, A. L. (2020). Geographical and economic conditioning factors for the development of MSMEs in Mexico. In A. L. Ramos-Soto, R. M. Sánchez, & M. A. Hernández, *The role of small and medium-sized enterprises in regional development* (pp. 39-60). Oaxaca: UABJO-FCA.

BBVA Research. (2023). Mexico | *How poor is the population that is in labor poverty*? BBVA Research

BBVA Research. (2022). *Labor poverty continues downward and below pre-pandemic levels*. BBVA Research

CONAPO. (2019). *Absolute marginalization index 2010-2020*. Retrieved June 28, 2025, from http://www.conapo.gob.mx/work/models/CONAPO/Resource/1755/1/images/01Capitulo.pdf

Gómez, M. A. (January-June 2016). Pigs and social control of the poor in the province of Antioquia, seventeenth century. *ACHSC Colombian Yearbook of Social History and Culture, 43*(1), 31-59. Retrieved June 28, 2025, from http://www.redalyc.org/articulo.oa?id=127143861002

Hernández, A. R., Torres, V. A., & Hernández, R. I. (2023). *Memories XV day FMVZ-UNAM.* Chapa de Mota: UNAM.

INEGI. (2020). *Cuentáme de México, educational section.* Mexico : National Institute of Geography and Statistics .

INEGI. (2024). *Press Release No.383/24.* Press Release , Aguascalientes, Mexico . https://www.inegi.org.mx/contenidos/saladeprensa/aproposito/2024/EAP_MIPYMES24.pdf

INEGI (2025-Q1). *Economic profile of Oaxaca*. DataMexico. INEGI.

Jordán, C. M., & Ortega, j. P. (2014). *Contribution of small-scale animal production to rural development.* Mexico: Reverte.

Mexico, G. d. (2025). *Oaxaca Labor Information 2025.* Mexico : Ministry of Labor and Social Prevention. Retrieved June 26, 2025, from http://siel.stps.gob.mx:304/perfiles/perfiles_detallado/perfil_oaxaca.pdf

Mexperience. (2023). Mexico's Minimum Wage Increased by 20% for 2024. Greenberg Traurig.

OECD. (2024). *Employment Outlook 2024*: Country Note – Mexico. OECD

ILO. (2019). *Informality in the ILO Vision: Evolution and Prospects for Latin America.* Switzerland: International Labour Organization. Retrieved June 28, 2025, from https://www.ilo.org/es/resource/article/la-informalidad-en-la-vision-de-la-oit-evolucion-y-perspectivas-para

Rodríguez, M. d., & Martínez, I. M. (2022). Sustained agroecological management of pig production in the tropics. *Journal of Agricultural Research and Scientific Dissemination, 26*, 190-219. https://doi.org/http://doi.org/10.53897/RevAIA.22.26.25

SCHTI. (2024). *Benefits of pork consumption.* Mexico: Secretariat of Sciences, Humanities, Technology and Innovation. Retrieved June 29, 2025, from https://www.ciad.mx/beneficios-del-consumo-de-carne-de-cerdo/

Sotelo-Forero, L., Ayala-Suárez, Y. A., & Vallejo-Zamudio, L. E. (2025). Municipal disparities in Boyacá, Colombia: An analysis through the concept of marginalization, 2005-2018. *RIDI,* 139-160. https://doi.org/https://doi.org/10.19053/uptc.20278306.v14.n2.2024.18162